On page 3, line 3, please delete the blank line and insert -- 08/869,276 -- in its place.

In the Claims

Please amend claims 13, 16-18, 25, 27-28, 33, 35, 55-59, 79-82, 87, and 90 as follows:

B1 SUB D1

13. (Amended) A system for performing PCR and monitoring the reaction in real time during temperature cycling comprising:

a sample container for holding a PCR sample, the sample container comprising an optically clear material, the sample container holding less than 1 milliliter of a sample[, the sample container] and having a first side, a second side, and an end;

means for positioning the PCR sample in a monitoring position;

means for heating the PCR sample;

means for cooling the PCR sample;

control means for repeatedly operating the means for heating and the means for cooling to subject the PCR sample to thermal cycling;

means for optically exciting the sample to cause the sample to fluoresce; and

means for detecting the fluorescence of the excited sample.

B2 SUB E4

16. (Amended) A system for performing PCR and monitoring the reaction in real time during temperature cycling as defined in claim 15 [further comprising a control mechanism which] in which the control means adjusts the operation of the means for heating

and the means for cooling to alter the times the means for heating and the means for cooling operate in accordance with the reaction parameter.

B2 17. (Amended) A system for performing PCR and monitoring the reaction in real time during temperature cycling as defined in claim 15 [further comprising a control mechanism which] in which the control means adjusts the operation of the means for heating and the means for cooling to alter the rate at which the biological sample is heated and cooled in accordance with the reaction parameter.

18. (Amended) A system for performing PCR and monitoring the reaction in real time during temperature cycling as defined in claim 13 wherein the sample container [comprises a container] is fabricated at least partially from glass[and], the sample container having a volume not greater than about 10,000 μℓ.

E3 SUB D4 25. (Amended) A system for performing PCR and monitoring the reaction in real time during temperature cycling as defined in claim 24 wherein means for detecting the [fluoresce] fluorescence of the excited sample comprises a photo detector structure positioned so that the radiation emitted from the side of the sample container is detected.

B4 SUB E9 27. (Amended) A system for performing PCR and monitoring the reaction in real time during temperature cycling as defined in claim 26 wherein the means for detecting the [fluoresce] fluorescence of the excited sample comprises a photo detector structure positioned so that the radiation emitted from the end of the sample container is detected.

SUB D5 28. (Amended) A system for performing PCR and monitoring the reaction in real time during temperature cycling as defined in claim 13 wherein the means for determining at least one reaction parameter in accordance with the detected [fluoresce] fluorescence comprises means for determining at least one reaction parameter selected from the group consisting of: product melting temperature, product melting time, product reannealing

temperature, product reannealing time, probe melting temperature, probe melting time, primer annealing/extension temperature, and primer annealing/extension time.

33. (Amended) A system for performing PCR and monitoring the reaction in real time during temperature cycling comprising:

a plurality of sample containers for holding a plurality of PCR samples, [the] each sample container comprising an optically clear capillary tube, each sample container holding less than 1 milliliter of a sample and having a sealed end and an open end with a sealable closure on [another] the open end;

means for holding a plurality of sample containers, the means for holding comprising a rotatable carousel holding the sample containers;

means for forcing hot fluid into contact with the plurality of sample containers;

means for forcing cool fluid into contact with the plurality of sample containers;

means for repeatedly operating the means for forcing hot fluid and the means for forcing cool fluid to subject the PCR samples to thermal cycling;

means for optically exciting at least one selected PCR sample to cause the selected PCR sample to fluoresce;

means for detecting the fluorescence of the excited selected PCR sample at both a first wavelength and a second wavelength; and

means for determining at least one reaction parameter for the selected PCR sample in accordance with the detected [fluoresce] fluorescence at the first and second wavelengths and displaying the reaction parameter in a visually perceptible manner in real time.

B6

35. (Amended) A system for performing PCR and monitoring the reaction in real time during temperature cycling as defined in claim 33 wherein the means for determining at least one reaction parameter in accordance with the detected [fluoresce] fluorescence at the first and second wavelengths and displaying the reaction parameter in a visually perceptible manner in real time comprises means for determining a reaction parameter selected from the group consisting of denaturation temperature and time, primer annealing temperature and time, probe annealing temperature and time, enzyme extension temperature and time, and number of cycles.

B7

SUB D7

55. (Amended) A system for carrying out and monitoring the progress of [a] first and second biological [reaction] reactions comprising:

first holding means for holding a first biological sample;

second holding means for holding a second biological sample;

transporting means for moving the first and second means for holding between a non-monitoring position to a monitoring position;

thermal cycling means for repeatedly heating and cooling the first holding means and the second holding means in both the non-monitoring position and in the monitoring position to carry out thermal cycling on both the first biological sample and the second biological sample;

monitoring means for ascertaining the first biological reaction in the first means for holding and the second biological reaction in the second means for holding when the first and second biological [sample is] samples are in the monitoring position, the means for monitoring comprising means for detecting radiation emitted from the first and second biological [sample] samples; and

controlling means for controlling the operation of the transporting means, thermal cycling means, and the monitoring means such that the progress of the first and second biological [reaction] reactions is detected as thermal cycling occurs.

56. (Amended) A system for carrying out and monitoring the progress of [a] first and second biological [reaction] reactions as defined in claim 55 wherein the monitoring means comprises:

an excitation source emitting excitation radiation;

means for directing the excitation radiation to the monitoring position such that when the [sample] first and second biological samples are located at the monitoring position the samples emit [emits] radiation;

means for converting the emitted radiation to an electrical signal;

means for processing the electrical signal to arrive at a reaction parameter;

means for displaying the reaction parameter; and

means for recording the reaction parameter.

57. A system for carrying out and monitoring the progress of [a] first and second biological [reaction] reactions as defined in claim 56 wherein the reaction parameter is selected from the group consisting of denaturation temperature and time, primer annealing temperature and time, probe annealing temperature and time, enzyme extension temperature and time, and number of cycles.

58. A system for carrying out and monitoring the progress of [a] first and second biological [reaction] reactions as defined in claim 56 wherein:

the excitation source comprises a photo-emitting source, the photo-emitting source selected from the group consisting of a xenon lamp and a light emitting diode;

B7

the means for converting the emitted radiation to an electrical signal comprises a photo-detection device, the photo-detection device selected from the group consisting of a photo-multiplier tube and a photo-diode; and

the means for processing the electrical signal to arrive at a reaction parameter comprises a microprocessor.

59. A system for carrying out and monitoring the progress of [a] first and second biological [reaction] reactions as defined in claim 58 wherein the means for converting the emitted radiation to an electrical signal comprises a first photo-detection device, the first photo-detection device is selected from the group consisting of a photo-multiplier tube and a photo-diode and a second photo-detection device, the first photo-detection device and the second photo-detection device selected from the group consisting of a photo-multiplier tube and a photo-diode.

B8

79. (Amended) A device for monitoring the fluorescence of a sample held within a sample vessel, said device comprising

a chamber;

a sample vessel holder for holding the sample vessel, said sample vessel holder located within said chamber, and said sample vessel comprising an optically transparent material and walls defining a volume having at least first and second dimensions wherein the first dimension is less than the second dimension and wherein the ratio of volume to external surface area of the vessel is less than 1mm;

a light emitting source mounted in said chamber and positioned to illuminate the sample vessel along an axis substantially parallel to a wall along the second dimension of the vessel; and

a light detector mounted in said chamber and positioned to measure fluorescence from the sample vessel along an axis substantially parallel to a wall along the second dimension of the vessel.

80. (Amended) The device of claim 79 wherein the sample vessel holder comprises a carousel for holding a plurality of [capillary tubes] sample vessels, said carousel being rotatably mounted in said chamber, said device further comprising

a stepper motor for rotating said carousel; and

means for coupling said carousel to said motor;

wherein said sample vessels are capillary tubes.

81. (Amended) The device of claims 79 or 80 [wherein the chamber is] further comprising [provided with] a heater and a fan [mounted in said device] in air flow communication with the chamber and a controller therefor for rapidly cycling the temperature of the chamber.

82. (Amended) A device for conducting PCR reactions said device comprising

a chamber;

a heater and a fan mounted in said device and in air flow communication with the chamber;

carousel for holding a plurality of sample vessels, said carousel being rotatably mounted in said chamber;

each of said sample vessels comprising an optically transparent material and walls defining a volume having at least first and second dimensions wherein the first dimension is less than the second dimension and wherein the ratio of volume to external surface area of [the vessel] each of said sample vessels is less than 1mm;

a light emitting source mounted in said chamber and positioned to illuminate at least one [of the sample vessels] selected sample vessel along an axis substantially parallel to a wall along the second dimension of the selected sample vessel; and

a light detector mounted in said chamber and positioned to measure fluorescence from [at least one of the sample vessels] the selected sample vessel along an axis substantially parallel to a wall along the second dimension of the selected sample vessel.

87. (Amended) A system for performing PCR and monitoring the reaction in real time comprising:

a chamber;

a heater and a fan [mounted in said device and] in air flow communication with the chamber and a controller for cycling the temperature in the chamber according to initial predefined temperature and time parameters;

a carousel for holding a plurality of sample vessels said carousel being rotatably mounted in said chamber, said sample vessels comprising an optically transparent material and walls defining a volume having at least first and second dimensions wherein the first dimension is less than the second dimension and wherein the ratio of volume to external surface area of the vessel is less than 1mm;

a light emitting source mounted in said chamber and positioned to illuminate at least one of the sample vessels along an axis substantially parallel to a wall along the second dimension of the vessel; and

a light detector mounted in said chamber and positioned to measure fluorescence from at least one of the sample vessels along an axis substantially parallel to a wall along the second dimension of the vessel;

means for displaying the status of the reaction based detected fluorescence.

B10

90. (Amended) The system of claim 87 or 88 wherein the sample vessels are capillary tubes each having an inner [diameters] diameter ranging from about 0.02 mm to about 1.0 mm.

Please add claims 118-127 as follows:

B11

118. A device for monitoring the fluorescence of a sample held within a sample vessel, said device comprising

a chamber;

a sample vessel holder for holding the sample vessel, said sample vessel holder located within said chamber, and said sample vessel comprising an optically transparent material and walls defining a volume having at least first and second dimensions wherein the first dimension is less than the second dimension and wherein the ratio of volume to external surface area of the vessel is less than 1mm;

a light emitting source positioned to illuminate the sample vessel along an axis substantially parallel to a wall along the second dimension of the vessel; and

a light detector positioned to measure fluorescence from the sample vessel along an axis substantially parallel to a wall along the second dimension of the vessel.

119. The device of claim 118 wherein the sample vessel holder comprises a carousel for holding a plurality of sample vessels, said carousel being rotatably mounted in said chamber, said device further comprising

a stepper motor for rotating said carousel; and

means for coupling said carousel to said motor;

wherein said sample vessels are capillary tubes.

120. The device of claims 119 wherein the chamber is further provided with a heater and a fan mounted in said device in air flow communication with the chamber and a controller therefor for rapidly cycling the temperature of the chamber.

121. A device for conducting PCR reactions said device comprising

a chamber;

a heater and a fan mounted in said device and in air flow communication with the chamber;

carousel for holding a plurality of sample vessels, said carousel being rotatably mounted in said chamber;

said sample vessels comprising an optically transparent material and walls defining a volume having at least first and second dimensions wherein the first dimension is less than the second dimension and wherein the ratio of volume to external surface area of each of said sample vessels is less than 1mm;

a light emitting source positioned to illuminate at least one selected sample vessel along an axis substantially parallel to a wall along the second dimension of the selected sample vessel; and

a light detector positioned to measure fluorescence from the selected sample vessel along an axis substantially parallel to a wall along the second dimension of the selected sample vessel.

122. A system for performing PCR and monitoring the reaction in real time comprising:

a chamber;

a heater and a fan in air flow communication with the chamber and a controller for cycling the temperature in the chamber according to initial predefined temperature and time parameters;

a carousel for holding a plurality of sample vessels said carousel being rotatably mounted in said chamber, said sample vessels comprising an optically transparent material and walls defining a volume having at least first and second dimensions wherein the first dimension is less than the second dimension and wherein the ratio of volume to external surface area of the vessel is less than 1mm;

a light emitting source positioned to illuminate at least one of the sample vessels along an axis substantially parallel to a wall along the second dimension of the vessel; and

a light detector positioned to measure fluorescence from at least one of the sample vessels along an axis substantially parallel to a wall along the second dimension of the vessel;

means for displaying the status of the reaction based detected fluorescence.

123. The system of claim 122 further comprising means for adjusting the controller such that one or more reaction parameters the reaction is adjusted in real time.

124. The system of claim 122 wherein the carousel comprises:

a disc having a top surface, a bottom surface, an outer edge extending therebetween, a sample receiving port in the top surface, a sample vessel port in the outer edge, and a sample passageway communicating with said sample receiving port and the sample vessel port, said sample vessel port and passageway formed for receiving and fixing a sample vessel to the disc.